

MULTI-TRANSDUCERS

For electric power systems

SHA

Instruction manual

TH-0082



CAUTION

- ◇ The handling of this product shall be carried out persons who have sufficient knowledge and skill to correctly use this.
- ◇ Connect all wiring's without any wrong connection after sufficiently identifying this connection diagram.
- ◇ Tighten screws surely. Slacking of screws may cause to generate heat and burning.
- ◇ Do not use this at any value exceeding the rated specification. It may cause a failure and an accident.
- ◇ Do not touch to the live part. Always cut out the circuit when maintained and inspected it.

1. GENERAL

A SHA form multi-transducer is a transducer for electric power of high-density mounting type which can measure simultaneously the electric amounts of many, such as voltage, current, electric power, invalid electric power, $\cos\phi$, and frequency, by one wiring. The analog output of a maximum of ten points and the pulse output of two points can be mounted.

2. TYPE NAME and SPEC No.

SHA-①②-③-④

Sign	Items	No.	Specification
①②	Circuit	11	1P2W 100V, 5A
		12	1P2W 200V, 5A
		21	1P3W 2×100V, 5A
		22	1P3W 2×200V, 5A
		31	3P3W 110V, 5A
		32	3P3W 220V, 5A
		41	3P4W 110/√3, 5A
		42	3P4W 220/√3, 5A
		99	Others (□→1:1P2W, 2:1P3W, 3:3P3W, 4:3P4W)
③	Auxiliary power supply	1	DC 19~31V
		2	AC 80~264V, DC 80~143V
		9	Others
④	Output	1	(-100~)0~100mV
		2	(-1~)0~1V
		3	(-5~)0~5V
		4	(-10~)0~10V
		5	1~5V
		6	(-1~)0~1mA
		7	(-10~)0~10mA
		8	4~20mA
		99	Others

3. SPECIFICATIONS

The specifications of the input, output, and auxiliary power supply are indicated on each unit. Make sure that these specifications conform to your demanded specifications. The power consumption of input and auxiliary power supply, working range of auxiliary power supply, and output load range are as specified below.

3.1 Rating of Unit

(1) Operating range and power consumption of auxiliary power supply

Rated voltage	Working range	Power consumption
DC 24V	DC 19~31V	10W以下
AC 100, 110V AC 200, 220V DC 100, 110V	AC 80~264V (50/60Hz) DC 80~143V	12VA以下 (AC) 7W以下 (DC)

(2) Output load resistance range, Rating of a pulse output

a) Voltage output range

(1/2)
The load resistance range is $600\Omega \sim \infty$ (infinite). However, load current is the value equivalent to 2mA when the output range exceeds $-5V \sim +5V$ range.

b) Current output range

The load resistance range is $0 \sim (10V \div \text{Upper-limit value of output range}) \Omega$. However, it is $0 \sim 750\Omega$ in case of 4~20mA specifications.

c) pulse output

It is the semiconductor relay (Photo Mos).

The maximum rating : AC 125V or DC 125V, 0.1A
Pulse width : 200ms

(3) operating range and consumption

Circuit	No	Voltage Input		
		Rated voltage	operating range	Consumption
1P2W	11	100V	0~150V	0.1VA
	12	200V	0~300V	0.2VA
1P3W	21	2×100V	0~150V	0.1VA
	22	2×200V	0~300V	0.2VA
3P3W	31	110V	0~150V	0.11VA
	32	220V	0~300V	0.22VA
3P4W	41	110/√3V	0~86.6V	0.04VA
	42	220/√3V	0~173V	0.08VA

Current Input			Frequency	
Rated current	operating range	Consumption	Rated frequency	operating range
5A	0~6A	0.5VA	50/60Hz	45~65Hz

3.2 Performance (23°C±2°C)

(1) Tolerance (Limit of intrinsic error at 23°C)

A, V, W, var, Hz ——— ±0.5%
 $\cos\phi$ ——— ±2.0%
 Watt demand, Amp demand ——— ±1.0%
 Wh ——— ±2.0%
 varh ——— ±2.5%

(2) Influence of temperature (with reference to a change of 10°C of ambient temperature)

———— Less than ±0.5%

(3) Influence of auxiliary power voltage (with ±10% change of auxiliary power supply voltage.)

———— Less than ±0.25%

(4) Response time (Time required for the output to become ±1% of the final steady-state value)

———— Shorter than 1S

(5) Output ripple

———— Within 1% p-p

(6) Influence of output load (Within the load resistance range)

———— Less than ±0.25%

3.3 Strength

(1) Insulation resistance (Across two points out of the input, output, auxiliary power supply, and FG, respectively)

———— Higher than 100MΩ at 500V DC

(2) Dielectric strength

Across two points out of the collective input, output, and auxiliary power supply, respectively.

———— 2000V AC (50/60Hz), 1min

Across output and case

———— 500V AC (50/60Hz), 1min

(3) overvoltage intensity ——— Twice of rated voltage, For 10s

(4) overcurrent intensity ——— 40 times of rated current, For 1s

(5) impulse voltage intensity ——— 6.0kV 1.2/50μS

3.4 Environment

(1) Operating temp ——— -10°C ~ +55°C

(2) Storage temp ——— -30°C ~ +70°C

(3) Humidity ——— Under 85% RH

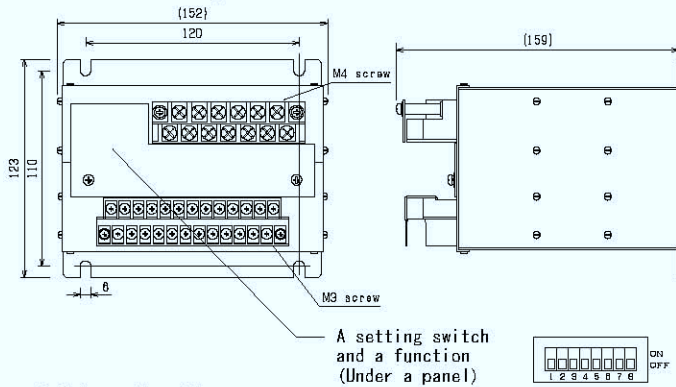
3.5 Structure

- Case ——— Iron (paint color: black)

- Terminal screw ——— M4 (input terminal), M3 (output terminal)

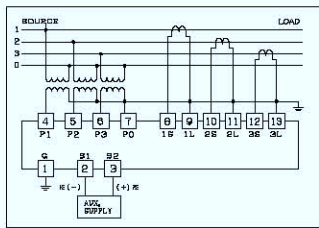
- Mass ——— 1.6 kg

3.6 Outside Drawing

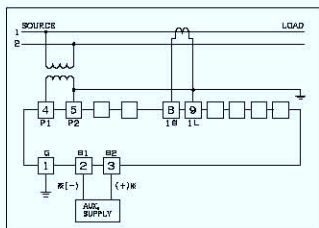


3.7 Connection Diagram

(1) Input connection Diagram

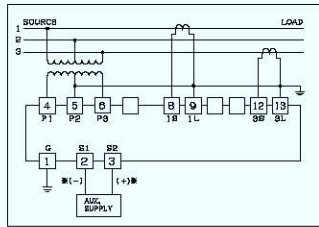


3P4W



1P2W

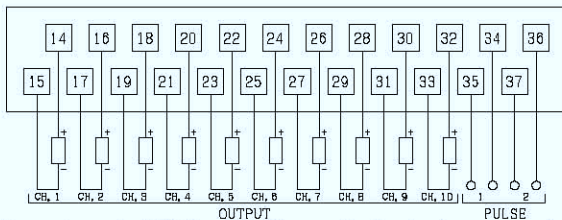
No	Function (Operation when turning ON)
1	PULSE1: pulse rate × 10
2	PLUSE1: pulse rate × 0.1
3	PULSE2: pulse rate × 10
4	PLUSE2: pulse rate × 0.1
5	For a maker setup
6	(The state of OFF usually)
7	A limiter is added to the minimum value of an output.
8	A limiter is added to the maximum value of an output.



3P3W, 1P3W

※ Only 24V power supply specification has polarity.

(2) Output Connection Diagram



As for the analog output(CH.1 ~ CH.10), negative terminals are connected.

4. INSTALLATION METHOD

4.1 Installation Environment

The mounting environment directly affects the unit life. Select the mounting environment, referring to the following items.

- (1) Ambient temperature and humidity**
Observe the ranges specified in [3.4 Environment] and avoid a high temperature, a high humidity, an abrupt change, or the like as much as possible when storing, transporting, and operating the unit.
- (2) Avoid a place generating sulfide gas, ammonia gas, or other corrosive gases as well as a place subjected to oil or watersplash.**
- (3) Don't vibrate or shock the unit continuously under the working condition.** The vibration capacity and shock capacity were tested under the following conditions to confirm the normal condition of the unit. Refer to these values for transportation, etc. of the unit. (These conditions conform to JISC1111 AC-DC transducers.)

Vibration --- Vibrations having a vibration frequency of 16.7Hz and a double amplitude of 4mm in X, Y, and Z directions for one hour each
shock --- An impact of 490m/S² normally and reversely in X, Y, and Z directions, 3 times each

- (4) Please contact us in advance if the unit is used under a special environment other than specified above.**

4.2 Installation

Process the attachment hole, referring to the Outside Drawing (3.6 item). For the ventilation, Please take the interval of 10mm or more.

4.3 Connection

Connect correctly, referring to the Connection Drawing (3.7 item) Notes in the case of connection are summarized to the next. Connects, after checking that all power supplies are off, input circuit, output circuit and auxiliary power supply.

- The terminal cover of an input terminal is fixed with the screw on either side. Please remove a screw and remove a terminal cover. The terminal cover of an output terminal serves as insertion by the terminal stand. Please push upward and remove. Please keep a terminal cover and a screw not to lose.
- An input terminal and a power supply terminal are solderless terminals for M4. An output terminal is a solderless terminals for M3.
- For safety, CT and VT by the side of an input should ground one side in especially high-voltage circuit
- Please be sure to ground a grounding terminal for safety and stability of operation.
- The product of DC24V has polarity in an auxiliary power supply terminal. If it connects conversely, it will not operate.
 - With the product whose power supply specification is DC 19~31V, No. 3 terminal is + and No. 2 terminal is -.
 - Power supply specification does not have polarity in a terminal at the product of AC 80~264V and DC 80~143V. Whichever it connects with, it operates normally.
- The cable to use should use a generous enough thing for cable diameter. The selection with consideration to the over-current is required for especially the cable linked to a current input.
- Wiring of an output signal should consider input side wiring and a power supply, and please separate it in a power line etc. Please use a shield cable and a twisted-pair cable if needed.
- When it drive Inductor and Relay etc., please be sure to take the measure such as surge killer to which overvoltage is not applied
- Please do not use an intact terminal. When you do not use an output terminal, please leave to opening and nothing should connect.
- Surely, after the completion of connection work should check having screwed up the screw certainly, and should attach a terminal cover.

5. MAINTENANCE AND CALIBRATION

(1) MAINTENANCE

The characteristic of a transducer is stable. Neither periodical maintenance, nor check, parts exchange, etc. are needed.

(2) Output adjustment

[SPAN] and [ZERO] Control Knobs are mounted in the surface Panel. "SPAN" can adjust about 10% and "ZERO" can adjust about 5% of the range of output span. (An adjustment machine is under a printing panel. Please remove a printing panel.)

(3) Calibration

Please adjust a product in the following procedure after preparing the standard instrument which can measure an incoming signal and an output signal when readjustment is required, since it was adjusting at the time of shipment.

- After connecting the standard instrument to the input and output, apply the auxiliary power supply to the unit, and warm up the unit for longer than 15 minutes.
- Apply a signal equivalent to the lower limit of the input range to the input, and adjust the [ZERO] control knob to obtain its corresponding output.
- Apply a signal equivalent to the upper limit of the input range to the input, and adjust the [SPAN] control knob to obtain its corresponding output.
- Repeat steps ② and ③, and make sure that the unit has been adjusted completely.
- Check the input/output characteristic at each point in the input range.

For about a pulse output, readjustment is impossible. By changing a setting switch, multiplier is made to ×10 of the value at the time of shipment, or ×0.1. (Refer to 3.6 clauses.)

(4) Others

LED of the front of a product is turned on at the time of normal operation. It blinks, when abnormalities are discovered inside a product. Please ask, when it is blinking.

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